Letters to the Editor

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LIGHT SCATTERING BEHAVIOUR OF ACACIA CATECHUIC ACID IN COURSE OF ITS NEUTRALISATION WITH SODIUM HYDROXIDE

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An weighed quantity of Acacia Catechuic Acid (ACA) was taken in a 50 ml casia flask and dissolved in a little quantity of distilled water and requisite amounts of NaOH solution was added so as to neutralise it to different extent as desired. The volume was made upto 50 c.c. after further addition of distilled water. The flask was kept in a refrigerator at 4°C and the liquid was allowed to settle for about 24 hours. The liquid was finally examined with the Brice Phoenix Light Scattering Photometer after repeating the entire process of clarification etc. as mentioned earlier (Chakravorty 1966). The experiments

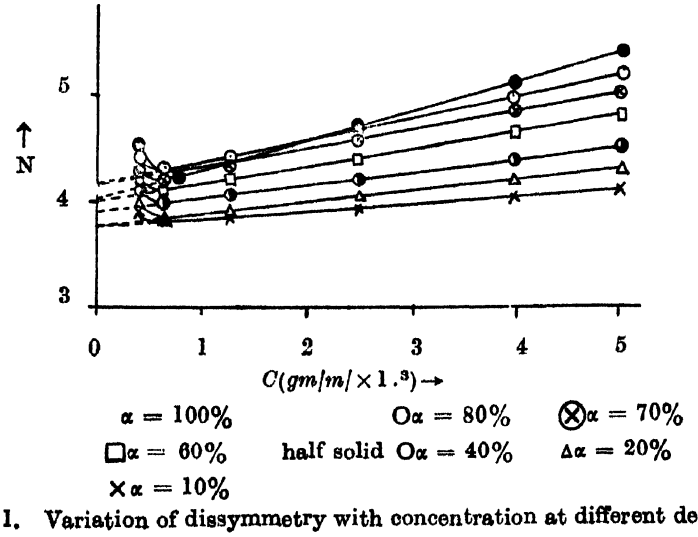

Fig. 1. Variation of dissymmetry with concentration at different degrees of neutralisation (α).

were performed with ACA solutions at different degrees of neutralisation and the results have been graphically represented in figs. 1 and 2.

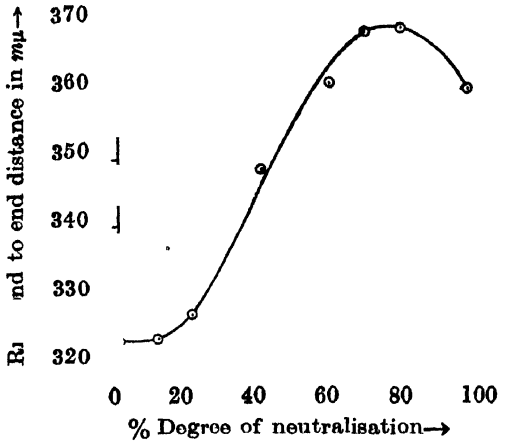

Fig. 2. Variation of root mean square end to end distance with degree of neutralisation.

The fig. 1 represents the variation of dissymmetry (Z) with concentration of ACA. There is a slight rise in the dissymmetry values at a very high dilution which may be attributed to high ionisation. The intrinsic dissymmetry values were obtained by extrapolating to zero concentration and the corresponding root mean square end to end distance $(\bar{h}^2)^{\frac{1}{2}}$ of the molecule (Stacey 1958) pertaining to the various degrees of neutralisation (α) has been represented in fig. 2. The rms end to end distance is 369 mμ and 360mμ at $\alpha = 75\%$ and $\alpha = 100\%$ respectively as against 327mμ in water (Chakravorty *et al*, 1963). It appears that the rms end to end distance increases with increase in the degree of neutralisation, becomes maximum at about $\alpha = 75\%$ and then decreases slightly at $\alpha = 100\%$. This behaviour can be explained as follows. With the addition of NaOH, ACA is gracually neutralised forming sodium salt which in its turn dissociates and increases the effective charge on the polymer thus leading to the gradual expansion of the polymeric coil. The little contraction observed beyond the point where $\alpha = 75\%$ appears to be due to the reduction of the charge density on the polyion owing to the increased rate of binding of counterions.

It may be useful to point out here that the dimensional change of the macromolecule has been expressed in terms of rms end to end distance $(\bar{h}^2)^{\frac{1}{2}}$. Zimm and Stockmeyer (1949) have shown that the radius of gyration ρ_g can be expressed as

$$\rho_g = a\sqrt{\frac{\sigma l_{av}^2}{6}} = a\sqrt{\frac{\bar{h}^2}{6}}$$

where σ and l_{av} represent respectively the number and average length of statistical segments, a is a constant, the value of which is equal to unity for linear polymer.

Under these conditions, therefore, the rms end to end distance may also be regarded as the relative measure of the radius of gyration.

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MAGNETIC PROPERTIES OF NATURAL CRYSTALS OF HEMATITE

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From magnetic measurements (Nèel *et al*, 1952; Lin, 1959) Within the temperature range 4°K to 950°K, of natural crystals of hematite (Elba), the presence of weak ferromagnetism and that of a transition in magnetic properties at about 250°K have been well established. From neutron diffraction studies (Shull *et al*, 1951) possibility of such a transition was ascribed to the change of the direction of the antiferromagnetic axis from that along the trigonal axis to that along the basal plane when the temperature is raised. Persistence of weak ferromagnetism even below 250°K which is contrary to the experimental observations with synthetic hematite (Guilaud, 1951), has been thought to be due to the presence of impurities, dislocations and non-uniformities in the lattice, which are usually present in the natural crystals. The magnetic behaviours of samples of hematite obtained from different origins are therefore expected to be different owing to the difference in the nature of the impurities and defects. But no experimental work has yet been reported to verify the suggestion. The study of the magnetic properties of a sample obtained from Brazil (Fe_2O_3 96.01% (with .5%FeO), SiO_2